

Leadership and Management

- The Chief Safety and Mission Assurance Officer shall serve as the Office of Primary Responsibility providing leadership, policy direction, assessment, and coordination of the technical requirements and process compliance verification for NPR 8705.2 throughout the life cycle of the system.
- The Chief Engineer/ Independent Technical Authority concurs on Membership of the Human-Rating Independent Review Team, approves technical requirements in Human-Rating Plan and concurs on Human-Rating Certification.
- The Program Manager: Requests that the ITA allow tailoring and/or exceptions to the requirements; generates a Human-Rating Plan (which includes tailoring and exceptions); generates traceability documents for the Human-Rating (H-R) Plan; implements the Plan; requests waivers and deviations from the ITA and requests Human-Rating Certification from Associate Administrator for Space Operations.
- The Associate Administrator for Space Operations and the Associate Administrator for Exploration Systems co-chair the Human-Rating Independent Review Team.

Scope

- The requirements in this NPR shall apply to all space systems (hardware and software), developed and/or operated by or for NASA that support human activity in space and that interact with crewed NASA human-rated space systems. This includes, but is not limited to, space systems, space suits, planetary bases, planetary rovers, and surface vehicles.

Process Check

- Ensure that the Analysis of failures includes human failures and human errors.
- All variances (excluding exceptions) are handled through the waiver and deviation process to ensure appropriate visibility into the inability to meet requirements.



YOUR PREPAREDNESS FOR AN AUDIT OF NASA HUMAN-RATING REQUIREMENTS WITH THESE SAMPLE AUDIT GUIDE QUESTIONS.

Leadership & Management:

1. How is your program's Human-Rating Plan controlled and configuration managed?
2. What is the level of review and approval for your program's Human-Rating Plan?
3. Where have you documented your Human-Rating Plan?
4. What critical functions have been identified for your program and where are they documented?

Core Process:

1. What is your process to assure and to maintain Human-Rating certification for the life of the program?
2. Who must approve technical compliance prior to implementation of a waiver?
3. Who must grant acceptance of risk prior to implementation of a waiver?
4. What is your preventative maintenance plan to sustain certification?

Process Check:

1. How do you demonstrate that appropriate process controls are in place for maintaining critical aspects of the certification throughout the life cycle of the program?
2. What quantitative and qualitative tools has your program used in the Human-Rating process?

NASA Office of Safety & Mission Assurance
300 E Street SW
Washington DC 20024-3210
www.hq.nasa.gov

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION SAFETY AND MISSION ASSURANCE REQUIREMENTS



NPR 8705.2

NASA Human-Rating Requirements

Compliance Verification Guide



OFFICE OF SAFETY AND MISSION ASSURANCE

This brochure is intended to be used as a guide only, not as a replacement for the actual policy. To review NASA Human-Rating Requirements (NPR 8705.2) in its entirety, see <http://www.hq.nasa.gov/office/codeq/doctree/texttree.htm>.

Explore. Discover. Understand.

What is the objective of the Human-Rating requirements?

- ▶ To provide the maximum reasonable assurance of safety for people involved with space flight activities.
- ▶ The Human-Rating process is used to maximize the safety of the crew and passengers by providing the requirements, procedures, and information to design and certify all space flight systems involving humans or interfacing with human space flight systems.

Each proposed Human-Rating Plan shall include:

- Design criteria
- System designs
- Test requirements and procedures
- Software design
- Test and verification requirements
- System safety and reliability engineering
- Human factors engineering requirements
- Health requirements
- Other program elements required to

The Human Rating Board consists of:

- Associate Administrator for Space Operations
- Associate Administrator for Space Explorations
- Chief Safety and Mission Assurance Officer-Office of Primary Responsibility
- Chief Medical and Health Officer Independent Technical Authority
- Chief Engineer/ Independent Technical Authority

MINIMUM AUDIT POINTS FOR NPR 8705.2

Management and Process

▶ Chief Safety and Mission Assurance Officer

- Shall, prior to the specified program review, concur (or non-concur) on specified volume of the Human-Rating Plan.
- OQE- Concurrence of the specified volume of the HRP
- Shall concur (or non-concur) on the human-rating certification of any space system to be crewed during any phase of flight.
- OQE- Human Rating certification signed by the Chief Safety and Mission Assurance Officer

▶ Chief Engineer (Independent Technical Authority)

- Shall concur (or non-concur) on the human-rating certification of any space system to be crewed during any phase of flight.
- OQE – Human Rating certification signed by Chief Engineer

▶ Program Managers

- Shall develop the Human-Rating Plan for all human space flight program activities, based upon the unique mission goals, technical and operational risk, other risk-management plan requirements, and specific characteristics of the program.
- OQE – Program Human-Rating Plan
- Incorporate critical functions, defined in the Human-Rating Plan as capabilities or functions that are essential to the safety of the public, crew, passengers, and/or vehicle, into the design documentation prior to the Preliminary Design Review (PDR).
- OQE – Human-Rating Plan for Critical Functions
- Shall ensure all space flight systems are designed, built, inspected, tested, and certified, specifically addressing the requirements for Human-Rating.
- OQE – Design Documentation and Program Human-Rating Plans
- Shall develop and implement a formal process to maintain the Human-Rating certification for the life of the program.
- OQE – Certification Procedures
- Shall establish a systematic program for system safety and human health to identify, analyze, track, and eliminate or mitigate hazards throughout the lifetime of the program.
- OQE – Human-Rating Plan/Risk Mitigation Plan
- If a hazard cannot be eliminated, shall design the space flight system to prevent the occurrence of the hazard or to reduce the likelihood and effect of the hazard.
- OQE – Design Documentation and Human-Rating Plan/Risk Management Plan

- Shall establish and utilize a continuous tracking method for documenting and sustaining compliance with all Human-Rating requirements after initial Human-Rating certification.
- OQE – Program Human-Rating Verification Tracking Log
- As part of the design process, shall establish, assess, and document the program requirements for an acceptable life cycle cumulative probability of safe crew and passenger return during all missions planned for the life of the program over which the system is expected to operate without major redesign or redefinition.
- OQE – Design Documentation and Human-Rating Plan

Process Check

▶ Chief Safety and Mission Assurance Officer

- Shall review the Human-Rating Plan for all proposed space flight systems, including changes and implementation, and concur or non-concur on the plan.
- OQE- Concurrence (Approval Page of Program Human Rating Plan)

▶ Chief Engineer (Independent Technical Authority)

- Shall provide the program manager with technically acceptable alternatives including their corresponding risk and value assessments.
- OQE – For each waiver, a list/description of technically acceptable alternatives to a requirement, including their corresponding risk and value assessments.
- Shall approve (or disapprove) waivers as technically possible.
- OQE- Documentation of waiver approval

▶ Program Managers

- Shall complete a comprehensive flight test program to validate predicted flight environments, flight control characteristics, critical design parameters, preflight analysis, and analytical math models - verifying the safe flight envelope and providing a performance database prior to the first operational flight.
- OQE – Flight Test Program Plan
- Shall verify space flight systems reliability and safety by test and analysis at the integrated system level prior to the first flight with humans on board.
- OQE – Flight Test Program Plan

▶ HRIIT

- Shall review each program's proposed Human-Rating Plan, including design criteria, system designs, test requirements and procedures, software design, test and verification requirements, safety and reliability requirements, human factors engineering requirements, health requirements, and other program elements required to achieve Human-Rating.
- OQE – Program Human-Rating Plan